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GEOPHYSICAL VARIABLES AND BEHAVIOR: L. INDICATIONS OF A TECTONIC STRAIN FACTOR IN THE RUTLEDGE (UFO) OBSERVATIONS DURING 1973 IN SOUTHEASTERN MISSOURI[1]

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Summary.—Temporal and spatial distributions of classic UFO phenomena recorded by Rutledge during the year 1973 in southeastern Missouri were examined. Despite exotic characteristics, the phenomena occurred during the periods of the only two earthquake episodes within the region; the most vigorous phenomena occurred on the day of or the day before the earthquakes. The spatial and temporal distributions of these phenomena were commensurate with the tectonic strain hypothesis that most verified UFO reports are generated by tectonic strain through as yet unspecified physical mechanisms. The results also indicated that *any* systematic collection of UFO reports should demonstrate the relation between regional tectonic strain and these phenomena.

The tectonic strain hypothesis states that the majority of verified UFO reports (UFORs) are veridical phenomena that are associated with changing geophysical stresses (strain) within the region (Persinger & Derr, 1984). Several studies (Derr & Persinger, 1986; Persinger & Derr, 1984, 1985a, 1985b) have shown systematic temporal and spatial relationships between the occurrence of UFORs (most frequently luminous or reflective globular phenomena) and consequent earthquakes days to weeks afterwards. Later seismic activity has been used operationally as an inference of tectonic strain during the occurrence of UFORs. Although the precise nature of the spatial-temporal relationships between UFORs and seismic activity must be established, the relationships appear to reflect the construction of the local crust and the *regional* mechanism of strain release.

If the hypothesis is a valid explanation for UFORs, then the concept of tectonic strain should be supported by any systematically collected data base, including those that are given alternative interpretations. The Rutledge (1981) field observations are classic examples. They involved the observation of luminous globs of light, metallic looking objects, and flashing or strobe-light like observations primarily during the years 1973 and 1974. All of these observations occurred approximately 100 km to 200 km away from the most active earthquake area in the central USA: the New Madrid Region (Missouri). Although occasionally very similar phenomena have been noted on the days of or the days before earthquakes in various areas of the earth for at least two centuries (Persinger & Lafreniere, 1977), these observations

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were considered indicators of extraterrestrial intelligence by Rutledge (1981). The following analyses were completed to determine whether the observations of Rutledge were associated with regional earthquake activity.

The data were obtained from J. S. Derr with the permission of Rutledge; they were collected between the years 1973 and 1979. Only the year 1973 was selected for analysis because (a) it contained the majority (71%) of the reports and (b) reports between 1974 and 1979 referred to frequent experiences of "coincidences" that are likely to involve psychological variables (Persinger, 1984, p. 957). These variables frequently emerge with prolonged exposure to the vicinity of luminous phenomena and suggest widening of affect and an enhanced "sense of the personal" (Persinger, 1983).

Observations involved a total of 43 separate days. There were two basic types of observations, (a) classic Fortean displays (Persinger & Lafreniere, 1977)—primarily unexplained light flashes and strobe-light like phenomena—and (b) modern UFO descriptions or exclusively globular lights with erratic movements and metallic or dark-colored objects. Earthquake data for the central region from the Otto W. Nuttli and K. G. Brill (Barstow, Brill, Nuttli, & Pomeroy, 1981) catalogue were obtained on magnetic tape from the United States Geological Survey (Golden, Colorado). The number of total observations as well as Fortean and UFO reports (separately) per 10-day block, starting from April (first observation) through December, 1973 were determined. For analysis a 10-day block was selected for simplicity and because it was within the time frame that minimally fragments or masks the intrinsic pattern of these phenomena.

The temporal distribution of UFORs indicated that they clustered around the occurrence of the *only* two earthquake periods in the region (within 1000 km). *Two* seismic events occurred on May 5, 1973 (mb = 3.4 and 3.2, distance approximately 400 km from Piedmont) while two quakes occurred on separate days (but in the same 10-day block) on October 2 (mb = 3.4, distance approximately 200 km from Piedmont) and October 9 (mb = 3.7, distance approximately 200 km from Piedmont). Fig. 1A shows the percentage of total numbers of UFORs for the two episodes (n = 64 and 12, respectively). The vertical solid bar refers to the percentage of UFORs occurring on the same day and the day before the earthquake only. As can be seen, the majority of UFORs occurred during the same 10-day blocks in which the earthquakes occurred. Chi-squared analyses indicated that these marked increases in UFORs were statistically ($p \leq .001$) significant (χ_{10}^2 = 53.10, 42.00, respectively). There was no obvious difference, i.e., $\pm$ 5%, between the distribution of Fortean and modern UFO-type reports, consequently these data were combined.

Calculated distances (using SPSSX software) between all epicenters from the Nuttli file and Farmington and Piedmont (the two most frequently

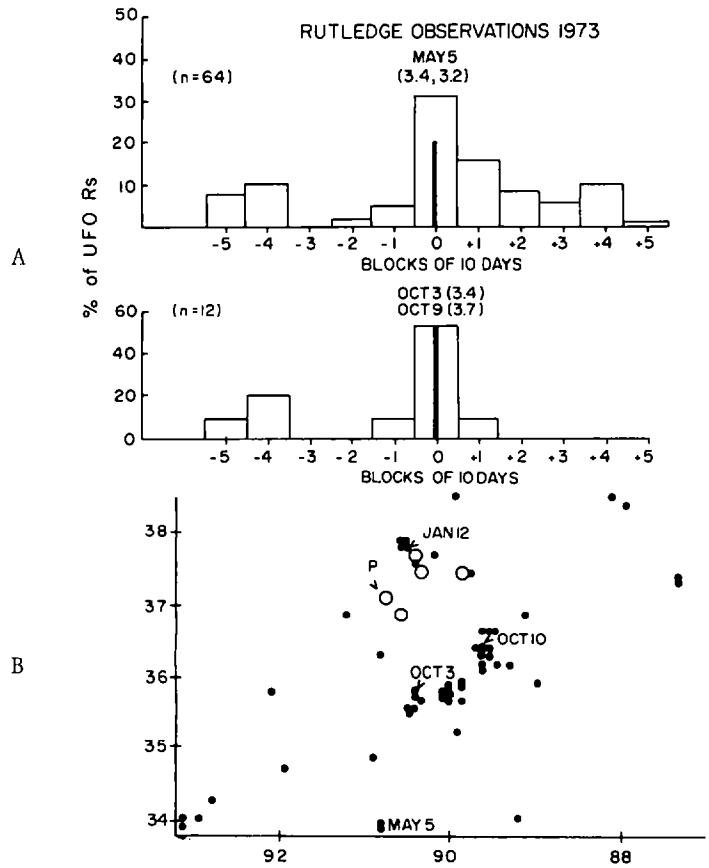

Fig. 1. (A) Temporal distribution of the percentage of all UFO observations by Rutledge within successive 10-day segments before (−), during (0), and after (+) earthquake episodes for the May, 1973 and October, 1973 seismic episodes. Numbers in parentheses refer to magnitudes of the quakes; n refers to total number of UFO reports within the episode. (B) Spatial distribution of all earthquake epicenters (closed circles) within the central USA (vertical axis = N latitude; horizontal axis = W longitude) between 1970 and 1977; epicenters of earthquakes during the year 1973 are indicated. The open circles refer to the major UFO observation areas. P refers to Piedmont.

quoted areas) indicated that earthquakes had occurred within 10 km of Farmington on June 9, 1971 (mb = 3.1) and at the beginning of 1973 (January 12, mb = 3.1); another quake occurred within 20 km on December 13, 1976 (mb = 3.5). The area within 50 km of Farmington had no significant activity between the years 1900 and 1969; at that time an epicenter occurred under the town. The closest (10 km) quake to Piedmont had occurred in 1956. An earthquake (3.6 mb) on August 11, 1974 (which was followed by a conspicuous decrease in the number of events in the

Rutledge file) occurred within 50 km of Piedmont; this seismic event was the strongest and closest since 1967. Such increase in the incidence of detectable earthquakes within 200 km of the sighting area during the decade surrounding the years in which UFORs become more frequent is commensurate with the hypothesis of accumulation and release of strain.

The spatial distribution of the areas in which the UFORs occurred and the distribution of earthquake epicenters between the years 1970 and 1977 are shown in Fig. 1B. The major distribution of seismic activity forms a quasicircle opposite to and southeast of the areas in which UFORs were identified. The positions of the only earthquakes during the year 1973 for which data were analyzed are indicated. It is relevant that the area of maximum seismic activity occupies the New Madrid zone.

The analysis indicates that the phenomena recorded by Rutledge during 1973 near Piedmont were associated with tectonic strain within the region. If the phenomena had not been coupled to earthquake activity, the peak distribution around the only two earthquake blocks of the entire period would not have occurred. The occurrence of 20% of the reports in episode one and 55% of the reports in episode two on *the day of and/or the day before* the seismic events indicates that these phenomena could be related to earthquake lights (Derr, 1973, 1986).

Observations of colored balls of light or flying objects were observed during or just before some quakes in Japan and Italy between the mid-1800s and 1930 (Terada, 1931). Many earthquake lights can (and often more frequently) occur at distances as far as 100 to 500 km away from the earthquake epicenter (Yasui, 1974). Luminous phenomena at this distance at the time of an earthquake have been used as the basis for inference of regional occurrence of strain (or a strain pulse) that is generated by the seismic process (Derr & Persinger, 1986; Persinger & Derr, 1985b). If this assumption is correct, then strain must have continued for about seven weeks after the May 5 quakes and transiently preceded both the May and October quakes by 40 to 50 days. The marked similarity between the observations of UFORs made during the earthquake intervals and the observations made during the periods before and afterwards suggests that a similar process was likely responsible for the occurrence of all of the UFORs.

The spatial distribution of UFORs in Fig. 1B indicated that most of Rutledge's observations occurred in an area near the opposite side of the seismic activity within the region. The occurrence of luminous phenomena in an area with the least seismic activity that is distributed in a crescent shaped spatial pattern has been observed in both the Uinta (Persinger & Derr, 1985a) and Yakima (Derr & Persinger, 1986) episodes. The functional significance of this pattern is not clear but is commensurate with the con-

cept of UFOR cluster in areas where strain accumulation has not been accommodated by local seismicity.

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